

AUGMENTED REALITY RESTAURANT MENU

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ABSTRACT:

When it comes to the world of refreshment and entertainment, restaurants are the first things we think about. We go to a restaurant to have a satisfying meal with our family and spend some quality time. But, we might not get a complete idea about the dishes that are present in the menu card just through their name. Certain questions like what ingredients are used in it, how the dish is served, Quantity of the dish served etc. rise. With these questions in mind, customers won't show interest in trying new dishes. In this perspective under customer interest, Our Application "Augmented Reality Menu" is developed. With this application, the Customer gets to acknowledge various aspects like the description of the dish, a detailed view, price and quantity of the dish that is served. With this application, customers can view any item in a 360 degree view provided with zoom in and zoom out options. After the order is placed by the customer, they may feel bored thus in the meantime; they can have a look at the other dishes till their order gets ready. This provides customers with a unique experience and makes them feel enthusiastic about the food they eat.

KEY TERMS: *Augmented Reality, Menu, Dish, Restaurant*

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INTRODUCTION

Human life is improving day by day technically, but the basic needs do not change, and food is one of them. Food is a common emotion for ages. In the case of restaurants and hotels, there will be a lot of versatility in food because of the many varieties. Despite having many dishes, many of the customers don't know what dish is of which type. So Augmented Reality can help the customers to know better what they want. This technology can be a revolution in food science. Moreover, it helps to visualize the dish so the customer can choose it easily among the dishes. Thus, the technology called augmented reality helps people to rediscover what they want, and this is how technology plays a vital role even in the selection of food according to the needs or requirements of the user. The images which are presented in the module or file have a complete description of the dish including all the properties such as color, ingredients, and the quantity which is given to the customer. This mainly changes the presentation of the menu card and the items. Generally, in the olden days, we used to have a menu written on a hanging slate. Then the menu is printed on a page and according to the dishes and types, the menu has just increased day by day and it became a book. In that book only items and cost of the item. And then the menu has developed with images and cost descriptions. But many people don't know how it looks while it is placed on the table. This is the first application which helps the customer to visualize the food before even placing the order. It may even catch the eyes of the customer and increase the order ratio of a customer and help in increasing the revenue of a restaurant. We just need a tab and an augmented reality prepared menu card to view the dishes in 360 degrees manner. So that the customer will have a clear view from each angle. Thus, augmented reality is useful in many ways. So except tasting the food we can give every minute detail about the food placed on the table to the

customer. All we need is just a tablet or a smartphone in order to utilize this feature. The menu will be printed in the book with a specific picture of each dish. Now we need to place the tablet above the menu card which is printed before with the pictures. The picture of the dish which is in the menu is scanned with the help of the tablet or a mobile. After the scanning, the picture is displayed with all the available dimensions.

Motivation

Once I went to a restaurant a kind of new in our place. I grabbed a menu card and saw a list of items, none of them were understandable. I took some time and finally ordered a dish. But the dish I ordered was bad in taste and saw another guy who faced the same issue over there. Finally, I found a dish which is served beside my table. So, I asked the waiter to bring me that dish. Finally, I had my lunch in that restaurant. These restaurants design dishes and name them in a way that the customer can't even understand.

Problem Statement

Every dish has its own style and ingredients but the problem is many people can't imagine the dish in a proper way. Because they don't even know, what dish consists of or what are used to prepare a dish. But they simply blame the dish or someone in the restaurant or the people who came with them. But the problem is no one likes every dish and a hotel is supposed to please everyone, so they need to maintain a lot of varieties and please many of the customers with the dishes they have, of course, the dish which is liked by the majority of the customers will be selected as the bestseller. But the main problem is many of the hotels give only descriptions but not visualizations about their cuisines. so customers just imagine the dish without any visuals. Sometimes they may get satisfaction but many customers' ends up getting disappointed. This is the main problem faced in a majority of the hotels especially with the new dishes and people who want to try something new. Some of the hotels describe the menu in detail but sometimes the implementation may not be the same as described in the menu. Because the image or process may be changed. But there is a case even though the description of an item is written very clearly, it may not reach the expectations of the customer by which he may become unsatisfied. This application is the perfect solution as it provides images in 360 degrees with a perfect description.

Scope

The project is carried out with the following scope: This application has scope all over the world. Because food is required for every human being in this world. And restaurants serve the food in a way that gets the attention of all our senses to it. Commercially this application can be used in hotels and even in small restaurants and drive-ins. This helps the customers to understand the menu card filled with a bunch of items with the made-up names of dishes.

Objectives

The project is carried out with the following objectives: To provide a visual feast for the customers.

- To provide detailed information about the dish that they are going to eat.
- Can be used as publicity for effective reach of start-up hotels and restaurants.
- Can be used to increase the order ratio in restaurants.
- To provide a visual of the items that are in the menu card with made up names of dishes.

SOFTWARE REQUIREMENT ANALYSIS

The software conditions are a description of the target system's characteristics and functionality. From the customer's perspective, the conditions might be apparent or unnoticeable, given or unknown, anticipated or unanticipated. Software demand analysis refers to the process of gathering software conditions from guests, assaying them, and establishing them.

SDLC (Software Development Life Cycle)

The systems development life cycle (SDLC) is a design operation abstract model that defines the processes involved in an information system development design, from early feasibility studies to operation conservation.

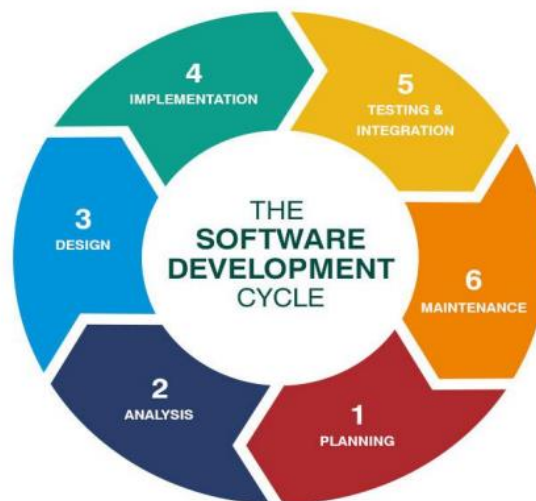


Figure 2.1: SDLC Diagram

Unified Modeling Language (UML)

It's a modeling language that may be used for a variety of purposes. The primary thing of UML is to establish a standard way to fantasize how a system was developed. It's relatively analogous to arrangements, which are employed in other sectors of engineering. UML is a visual language, not a programming language. UML figures are used to draw the address and structure of a system. Modeling, design, and analysis are all supported by UML, which is used by software masterminds, businesspeople, and system engineers.

Software Requirements

- Unity Technologies 'Unity is a cross-platform real- time machine. The machine can invoke three-dimensional and two-dimensional games, as well as simulations, for its numerous platforms.
- Adobe Photoshop is a software operation that allows that was created and released by AdobeInc. This software can modify and compact raster screen in several layers, and it supports masks, dawn compositing, and a variety of colour models, including RGB, Color palette etc.
- Vuforia is a virtual reality software development kit (SDK) for mobile devices that allows inventors to produce augmented reality apps. It recognizes and tracks planar film land (image targets) and introductory 3D objects similar as boxes in real- time using computer vision technologies. When seen through a mobile device's camera, this image recognition technology allows inventors to place and familiarize visual particulars, similar as 3D models and other media, in relation to real-world prints.

Hardware Requirements

- Markers are the things that drive the application. These markers are to be customized as per the client's requirements.
- A Tablet PC with few specifications added with external storage and a minimum ram of 3GB and storage of 32GB. It must be Android Version 5.0 or >5.0.
- A smartphone that has a feature of Time-lapse capturing tool or else an App that provides time-lapse feature.
- Laptop for editing the Food images and building the Application as per client requirement.
- A tripod stand and turntable for clicking photos of images. Added focus lights and green and white mats as the base screen.

PROPOSED SYSTEM

Our suggested system has created a unique tool that will allow you to drastically alter the way you show your menu and interact with your guests. We employ technology that allows you to see your menu in 3D via perpetration of the technology picture and photography. You may offer your menu to your guests in 3D employing smart device technology, allowing them to make educated mess selections and guarantee their expectations are fulfilled, if not surpassed.

Upgrading your capability to fulfill consumer prospects enables you to enhance your whole client service strategy. This means you may continuously change and stay a request leader.

Augmented Reality Food Menu

The flow diagram for the Arduino Board explains how to use the program in an eatery. Whereas after visiting an eatery and using the operation, the stoner is presented with a number of possibilities from which to choose. Following the selection of food constituents, the stoner will have a 3D food item in his office with a variety of menu selections. The purpose of our structures (house, plant, church, academy, etc.) is to cover our lives and effects. As a result, it's critical to have a stress-free and simple system of carrying out this thing. The figure represents the architectural model for the proposed system.

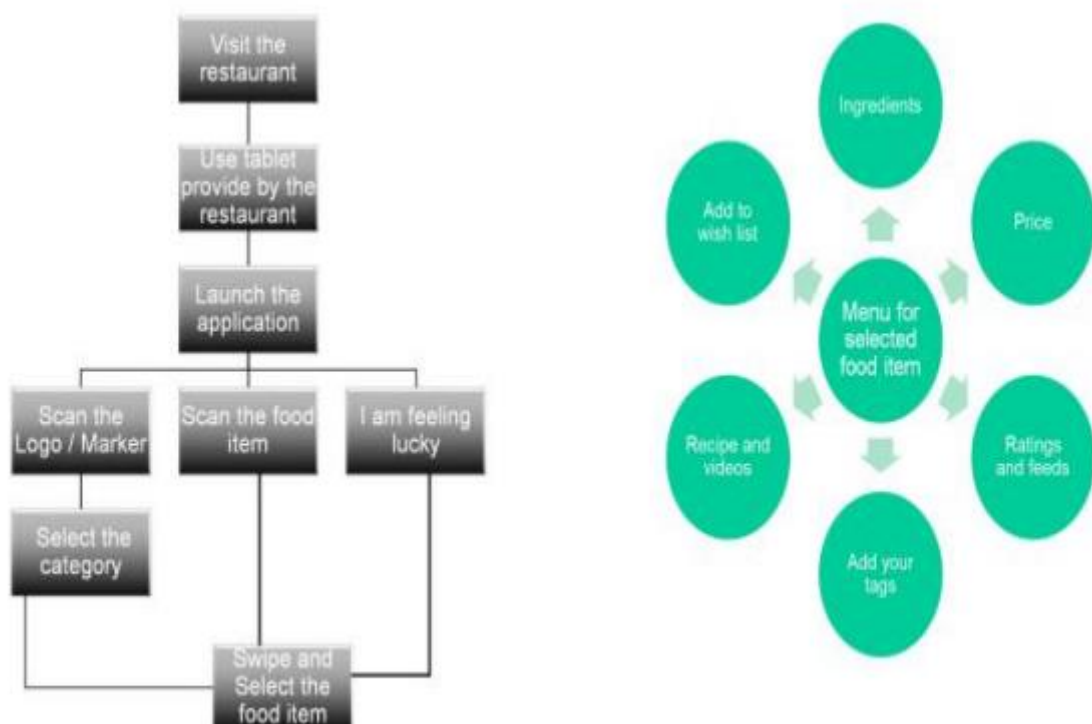


Figure 3.1: Proposed System Architecture

This software is a precious tool to your association since it allows you to spread your brand beyond your eatery walls and stationary photos on the internet. By installing this app, you come a member of a one-of-a-kind movement that's going to review the client experience. Your association and menu are the primary motorists behind your achievement.

By finding better ways you display your products to your target audience, this operation may help you take your strategy ahead and broaden your consumer base. We help you in creating strong foundations so that you can adjust to how technology is changing how customers want to interact with restaurants moment and in the future.

Flowchart of Proposed System

Figure 3.2 depicts the proposed system's flowchart..

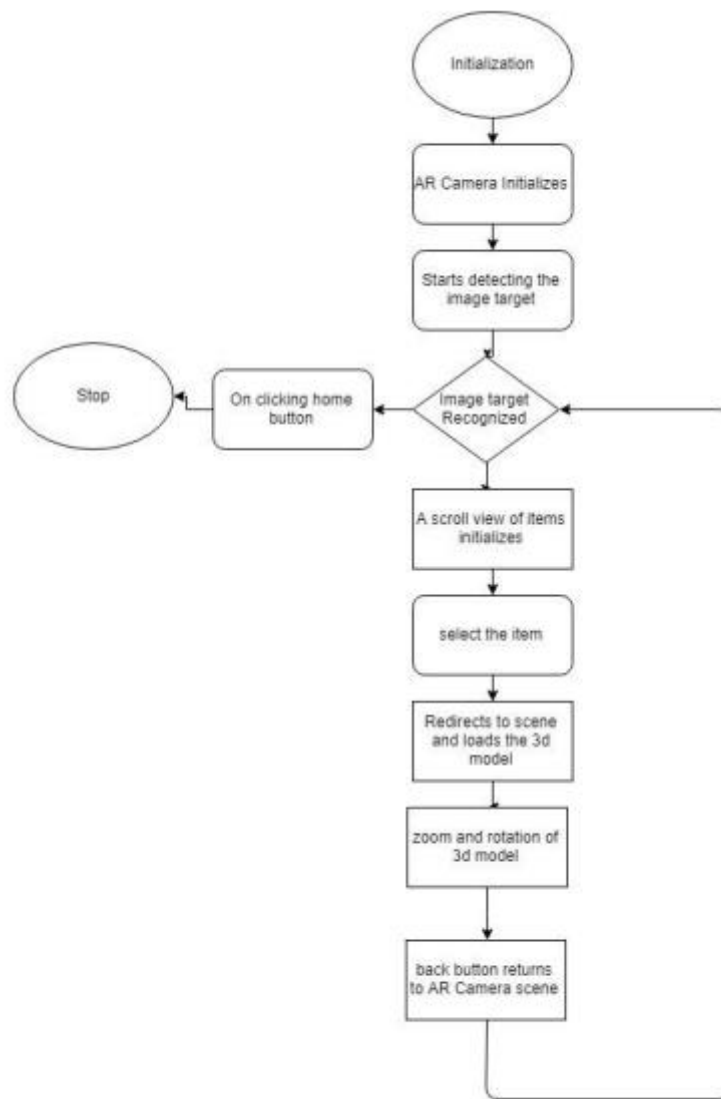


Figure 3.2: Flowchart of the Proposed System

METHODOLOGY

Step 1: The software is first installed in the tablet or smartphone with sd card inserted in it.

Step 2: Add the json file to the folder that is created with the installation of the application in the device. And also load the food item objects, images and the 3d objects into the sd card by managing the folders properly.

Step 3: Create a Vitoria database for the image targets that are to be recognized by the application by loading the images into the database and importing the database into unity.

Step 4: Start the application and it recognizes the image target and the images of the food items that are related to that image target appear as a list with a scroll view.

Step 5: When a wished food item is selected, the detailed view of the food item is displayed.

Step 6: The detailed view consists of the description of the food item, cost of the item, and the preview of the food item that is served with a rotation effect.

Step 7: The rotation effect is obtained by swiping the screen in horizontal motion and zoom effect is also obtained.

Step 8: When the home button is clicked, then the camera starts again and recognizes the image target.

IMPLEMENTATION

The system contains a Tablet PC and Markers with an android app. The whole system is built on unity gaming and animation software. The system collects all information from the app data, SD Card and Json file. The use of markers is for displaying the menu items on the detect marker which is based on cuisine. If the marker is placed before the Tab's camera the Menu list is being displayed such that any of the items can be selected based on the customer's requirement. After that, a screen opens with the item description and the Food visual in 360°. The user can interact with the item as it is being presented like how the chef gets the food that the customer ordered. This project has three Modules. Those are

- Gathering pre-requisites of the food items
- Assembling the food items and content to the storage locations.
- Designing the application UI as per client requirements.

TESTING

A software testing examination is one that's carried out to give investors with information concerning the effectiveness of the software testing that examines the functionality. Product testing may also give an impartial, impartial picture of the software, allowing businesses to realize and comprehend the risks associated with software deployment. The process of running a program or operation with the thing of relating software bugs (crimes or other problems) and ensuring that the software product is fit for use is applied to as testing. The implementation of a software element or system element to assess one or further attributes of interest is applied to as software testing. These features, in general, reflect the degree to which the element or system during the test.

Validation testing

In this validation testing, we have tested with markers which are registered. The menu items must come on the registered marker. The markers vary based on the cuisine and food type. The marker is shown in Figure 6.1 and the output is shown in Figure 6.2



Figure 6.1: Object Test Connection



Figure 6.2: Object Test Connection

White box and black box testing methodologies are used to test and validate the system. The Path testing system is used to test the code in White box testing. The focus of black-box testing is on the fulfillment of functional requirements.

White Box Testing

Path testing, frequently known as structured testing, is a white box testing approach used to construct test scripts. This system examines a program's control flow graph to determine a directed towards achieving a linearly independent path of performance. Path testing is a system of testing that ensures each path of a program has been run at least formerly. A program flow graph is the starting point for path testing. This is an architecture representation of all the program's pathways. A flow graph is made up of nodes that indicate choices and edges that reflect the flow of control. The Path Testing Flow graph is shown in Figure6.3.

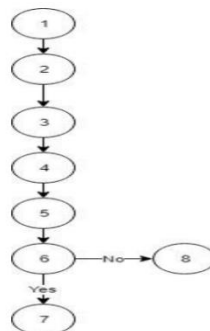


Figure 6.3: Path Testing Flow graphs.

The flow graph is created by substituting analogous plates for program control instructions. It's an easy procedure to induce a program's flow graph if there are no go-to statements in it. Each branch of an if- also- differently or case statement is represented as a distinct route. A circle is represented as an arrow that circles back to the condition node. Path testing's thing is to guarantee that each separate path through the program gets run at least formerly. A program path that's independent travels at least one new edge in the flow graph. In program language, this involves putting one or further new conditions to the test. All conditions must execute both the true and false branches.

Independent paths

Path 1: 1-2-3-4-5-6-7

Path 2: 1-2-3-4-5-6-8

Test Suite

Table 6.1: Test Suite for white Box Testing

Stage	Test Steps	Test Input	Expected Result	Actual Result	Status
1	Path 1	Markers Recognition	Content Display	Menu Content	Pass
2	Path 2	Placing New Marker which is not registered.	No content should come.	No content appeared.	Pass

RESULTS

- Components are used for getting Menu as shown in the below Figure 7.1

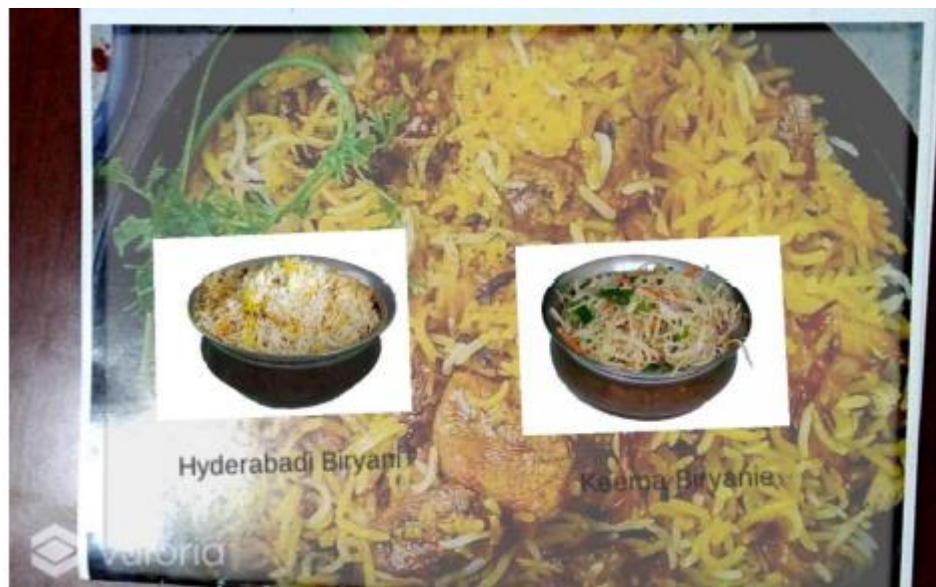


Figure 7.1: Menu Items Appearing on Menu

- Selecting an item will give out this screen as shown in Figure 7.2



Figure 7.2: Item Display with Description

- The present UI model that is being used in the restaurant with the normal font as shown in Figure 7.3



Figure 7.3: App UI Screen that is being used for Royal Nawab Restaurant

CONCLUSIONS AND FUTURE WORK

The main objective is to build and implement a successful application for a restaurant where the user can easily see the food in the 3-D model before ordering. User can find the restaurant popularity on the basis of real-time feeds. User can comment about the dish by tagging it. Depending upon the current scenario the restaurants are lacking in the presentation of the food which eventually affects their revenue, doing so the restaurants can have a better impact on customers and can increase their growth. This app is also helping in removing all the language barriers and odd names of dishes problem.

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